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FIG. 1-1

VAP-1 amino acid sequence (SEQ ID NO:1)

MAVLAVVLLACLERAQTFGCSNTKINDQARKMFYDAHNDARRSMAKGLE
PNKCGLLSGGKNVYELNWDCEMEAKAQEWADGCPSSFQTFDPTWGQNYATYM
GSIADPLPYASMAVNGWSEIRTVGLTDPDNKYTNSAMFRFANMANGKASAFG
CAYALCAGKLSINCIYNKIGYMTNAIIEKGDAC TSDAECTTYSDSQCKNGLCYK
APQAPVVETFTMCPSVTDQSDQARQNFLDTHNKLRTSLAKGLEADGIAAGAFAP
MAQMPKLVKYSC TVEANARTWAKGCLYQHSTSAQRPLGENLYMISINNMP
KIQTAE DSSKAWWSELKDFGVGSDNILTQAVFDRGVGHY TQMAWEGTTEIGCF
VENCPTFTYSVCQYGPAGNYMNLITYTKGSPCTADADCPGTQTCSVAEALCVIP

vap-1 cDNA nucleotide sequence (SEQ ID NO:2)

ATGGCGGTATTAGCAGTGGTACTTCTAGCATGCCCTGGAGAGCGGTTG
CACAGACGTTCCGCTGCTCTAACACCAAGATCAATGACCAGGCTCGTAAGAT
GTTCTATGATGCTCACAATGATGCAAGACGAGCATGGCTAAGGGCTTGAG
CCAAACAAGTCCGACTCTTATCTGGTGGAAAGAATGTTTATGAATTGAATT
GGGATTCCGAGATGGAAGCAAAAGCTCAGGAATGGCAGACGGAATGTCCCA
GCTCTTTCCAGACATTTGATCCAAACATGGGGCAGAACTACGCGACGTACAT
GGGATCGATTGCTGATCCGCTTCCATACGCTTCCATGGCTGTTAATGGTGGT
GGTCCGAAATTAGAACCGTAGGACTTACGGATCCTGATAACAAGTACACTAA

To Fig. 1-2



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FIG. 1-2

FROM Fig. 1-1

CAGTGCAATGTTCCGATTIGCTAATAATGGCAAAATGGTAAAGCTTCAGCTTTTG
GATGTGCATACGCGTTGTCCGCGAGGAAAACATCCATCAATTCATTTACAA
CAAGATAGGATACATGACCAATGCTATCATTTATGAAAAAGGAGATGCCGTG
ACCAAGTACGCTGAATGCACCACTACTCAGACTCACAAATGCAAAAACGGTC
TTTGCTATAAGGCACCTCAAGCTCCAGTCGTTGAGACTTTCACAAATGTGCCCT
TCGGTCACGACCAAGTCGGATCAGCGCGTCAAAACCTTCTTGGACACCCATA
ACAAATTGCCGTACAAGCCTTGCCCAAGGACTTGAAGCTGATGGAATTGCCGC
TGGAGCAATTGCACCAATGGCCAAAGCAATGCCAAACTGTTAAATACAGC
TGCACAGTTGAAGCAACGCCAGAACATGGGCAAAAGGATGCCCTTACCAGC
ATTCAACAAGCGCACAGAGACCAGGACTCGGTGAAATCTTTATATGATCAG
CATTAAACAATGCCTAAATTCAAACCGGAGGACTCCTCAAAGGCTTGG
TGGTCCGAGTTGAAGACTTCGGAGTCGGTTCGACAACATTCAGACCCCAAG
CAGTTTTTGATCGTGGCGTTGGACATTACACACAAATGGCATGGGAAGGAAC
TACTGAAATTGGATGTTTTGTGGAGAAATGTCCAACATTCACCTTATCCGTAT
GCCAATATGGTCCAGCGGAAACTACATGAACCAACTAATCTATACCAAGGG
CTCACCATGCACAGCTGACGCCGATTGCCAGGAACCCAGACATGCAGTGTG
GCTGAAGCATTATGTGTTATCCCTTAGTAAATTTCTATGCAACTCTTGAAA
GTCATAATAAATATGCAAAATTAATAAAAAA

To Fig. 1-3



FIG.1-3

FROM Fig.1-2

VAP-2 amino acid sequence (SEQ ID NO:3)

MNVVLSAVTLFLIFRYAQTVNIEGSGNDELLEQNVWNVDDKVVVEALGGLDD
ELLTEHVCNKSTITLQQEII LTTNELLRRSLAFGKQRNKRGLMNGARNMYKLD
WDCELASLAANWSTSCPQHFMPSVGLSNAQLFKRFYFYFDGHDSTVHMRNA
MKYWWQQGEEKGNEDQKNRFYARRNYFGWANMAKGTYRVGCSYIMCGDG
ESALFTCLYNEKAQCEKEMIYENGKPCCEDKDCFTYPSKCLVPEGLCQAPSMV
KDDGGSFQCDNSLVSDVTRNFTLEQHNFYRSRLAKGFEWNGETNTSQPKASQM
IKMEYDCMLERFAQNWANNVFAHSAHYERPQNQCNLYMSSFSNPDPRSLIHT
AVEKWWQEELEFGTPIDNVLTPELWDLKGKAIGHYTQMAWDRTYRLGCGIANC
PKMSYVCHYGPAGNRKNNKIYEIGDPCEVDDDCPIGTDCEKTTSLCVISK

vap-2 cDNA nucleotide sequence (SEQ ID NO:4)

ATGAACGTGGTCCTTTCCGCTGTCACTCTTTTCTTATTTTCGATATGCCGAG
ACTGTGAATATAGAAGCCAGTGGAGGAATGATGAGCTTCTTGAGCAGAACG
TGTGGAACCATGTAGACGACAAAGTTGTAGAAGCACTTGGTGCTTGATGA
TGAACCTGCTAACCGAACAATGTGTGTAAACAAATCAACGATCACTCAGCTACAG
CAGGAGATCATCTTGACAACCCACAATGAATTACGAAGATCAATTGGCTTTTCG
GAAAGCAAAGAAACAAGAGAGGTCTCATGAACGGTGGAGAAATATGTATA
AACTGGATTGGGATTGTGAACCTGGCATCACTTGCAGCCAATTGGTCAACCTCC
TGCCCTCAGCACTTTATGCCGCAATCGGTACTTGGCTCCAACGCTCAGCTTTT

To Fig.1-4



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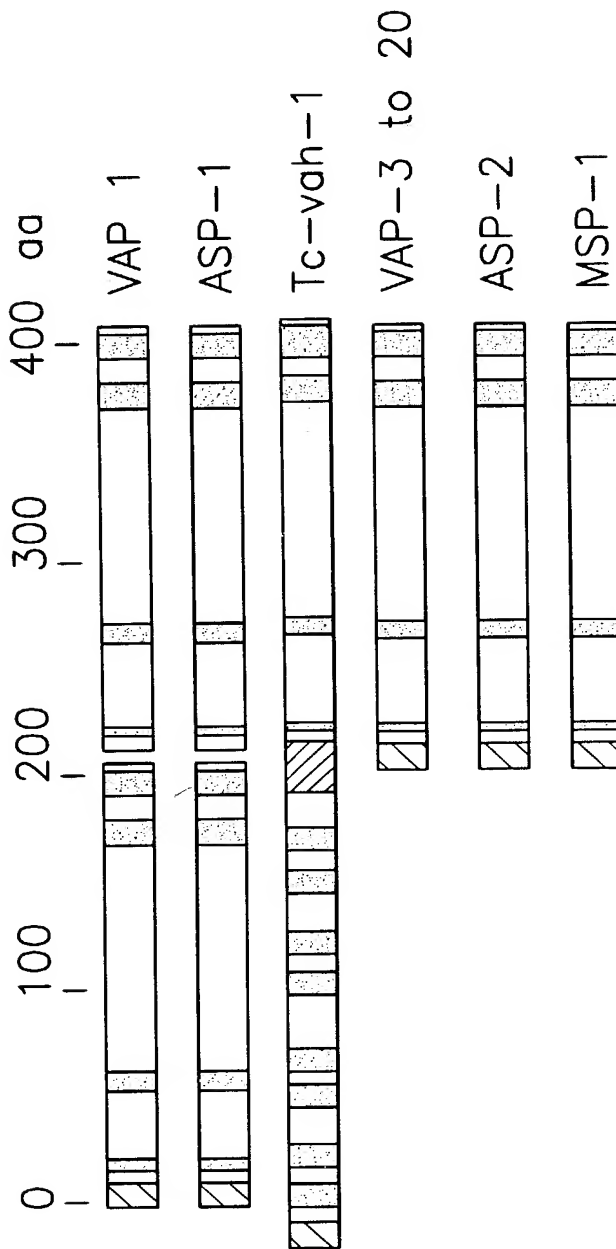
FIG. 1-4

FROM Fig. 1-3

TAAGCGTTTCTATTTTATTTTATTTGATGGCAGCACTCTACTGTACATATGCCAA
ACCGGATGAAGTATTGGTGGCAGCAAGGTGAAGAAAAGGCAATGAGGATC
AGAAAAATAGATTCTATGCCAGACGAAATTTTGGATGGCAACATGGC
AAAAGGAAAAACATATCGAGTTGGATGCTCGTATATTATGTGCGGCGACGGT
GAATCTGCACTTTTCACTTGTCTTTATAACGAAAAGCCCAATGCCAAAAG
AAATGATTTACGAAAATGGAACCCCTGCTGTGAGGATAAAGACTGTTTCAC
ATATCCAGGATCAAAATGTTTAGTACCTGAAGGATTATGTCAAGCACCTTCTA
TGGTAAAGGATGATGGAGGAAGTTTCCAATGTGATAACTCCCTTGTGTGAGA
TGTCACCCGCAATTTCACTTTGGAGCAACACAAATTTTATAGATCTCGTCTTG
CAAAAGGTTTGAATGGAATGGAGAAACAAACACTTCCCAGCCAAAGGCTAG
TCAAATGATCAAAATGGAGTATGACTGCATGTTGGAACGGTTTGCACAAAC
TGGGCAAAATAATTGCGTTTTCACACACTCGGCACATTACGAAAGACCGAATC
AGGTCAGAAATCTACATGAGTCTTCTCAAACCCCTGATCCTAGAAGCCTT
ATACATACGGCCGTCGAGAAAGTGGTGGCAGGAAATGGAGGAGTTCGGTACTC
CAATTGATAACGTTCTGACACCCGAAATGTGGGATTTGAAAGGAAAGCGAT
AGGACATTACACTCAGATCGCCCTGGATCGTACTTACCCTCTTGGTTGTGGAA
TCGCAAACTGTCCGAAGATGTCGTACGTGGTTTGTCACTATGGCCAGCAGG
CAACAGAAAGACAATAAAATCTATGAAATCGGGATCCTTCCGAAGTCCGAT
GATGATTGCCCCGATTGGAACAGATTGTGAAAGACAACTTCTTTATGTGTGAT
CTCAAAATAA

FIG.2

Schematic diagram of nematode venom allergen protein domains



hydrophobic signal sequence
conserved cysteine(s)



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FIG.3-1

CLUSTAL W Alignment of VAP-1, VAP-2, and selected other nematode VA proteins.

VAP-1N	1	-----MAVLAVVLLACLERA	VAQTFG	22
VAP-1C	1	-----PQAPVVETFTM		11
VAP-2N	1	MNVLSAVTLFLIFRYAQTVNIEGSGNDELLEQNWNVDVDDKVVEALGGLDEL	LTEHV	60
VAP-2C	1	-----	-----SFQ	3
ASP-1N	1	-----MFSPVIVSVIFT	AFCDASPARDGFG	26
ASP-1C	1	-----	-----DVPETNQQ	8
VAP-3	1	-----MNYLLLVVALAVG		13
MSP-1	1	-----MSNKLISILILTI		14

VAP-1N	23	CSNTKIN--DQARKMFYDAHNDARRRSM	AKGLEPN---	KCGLLSGGKNVYELN-WDC	MEA	76					
VAP-1C	12	CPSVT-DQS	DQARQNFLDT	HNKLR	TSLAKGLEADG	IAGAFAPMAKQMPKL	VKY	SCT	VEA	70	
VAP-2N	61	CNKST--ITQLQEI	ILTTIHNELRRSLAF	FGKQRN---	KRGLMNGARNMY	KL	D-WD	CELAS	114		
VAP-2N	4	CNSLV--SDVTRNFT	LEQHNFYRSRL	AKGFEWNG-ET	NTSQPKASQM	I	KME-Y	DCMLER	59		
ASP-1N	27	CSNSG--ITDKDRQAF	LDFFHNNARRRV	AKGVEDS---	NSGKLNPAK	KNMY	KL	S-WD	CAMEQ	80	
ASP-1C	9	CPSNT-GMTDSVRD	TFLSVHNEFRSSV	ARGLEPD--	ALGGNAPKA	AKML	KMV-Y	DCE	VEA	64	
VAP-3	14	CSADFG--SSGQNG	IINAHNTLRSKI	AKGTYVA---	KGTQKSPGT	NLL	KMK-WD	S	AVAA	66	
MSP-1	15	YTVVNSLTP	PEQNAVVDCT	INKYRSQL	ANGKTKN--	KNGGNFPSG	KD	ILEVS-Y	SKD	LEK	71

To Fig.3-2



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FIG.3-2

FROM Fig.3-1

VAP-1N	77	KAQEWADG	CPSS	FQT	FDPT	WGQNYAT	MGSI	ADPLPYAS	MAVNG	WSEI	RTVG	129	
VAP-1C	71	NARTWAK	GCLYQH	STSAQR	PG	LGENLYM	SINN	MPKIQTA	EDSSKA	WSEL	KDFG	125	
VAP-2N	115	LAA	NWST	SCIPQH	MPQSV	LGS	NAQLFKR	FYFD	CHDSTV	HMRNAM	KYWWQ	QGEK	171
VAP-2C	60	FAQNWAN	NCVFAH	SAHYER	PN	QGNLYM	SSFSN	PDPRSL	IHTAVE	KWWQE	LEEF	114	
ASP-1N	81	QLQDA	IQSC	PSAF	AG	IQG	VAQNVMS	WSSGG	FDPSPSVK	IEQTL	SGWWS	GAKK	134
ASP-1C	65	SAIRHGN	KCVYQH	SHGED	RPG	LGENIYK	TSVLK	FDKNKAA	KQASQL	WWNE	ELKE	119	
VAP-3	67	SAQNYAN	GCPTGH	HSG	DAG	LGENLYW	YWTSG	SLGDLNQY	GSAA	SASWE	KEFQ	DY	120
MSP-1	72	SAQRWAN	KCIFD	HNGTDL	YSGG	KFYGENLY	LDGDFE	HKNITQL	MIDACNA	WVGES	TTDG	130	

VAP-1N	130	LTD	PDNK	YTNSA	MFRFAN	MANGKAS	AFGCAYAL	CAGKL	SINCI	172		
VAP-1C	126	VGSD	NILTQA	VFDRG	VGHYTQ	MAWEGT	TEIGCFVEN	CPTFT	YSVCQ	171		
VAP-2N	172	NEDQ	KNR	FYARRN	YFGWAN	MAKGT	YRVGCSY	IMCGD	GESALFTCL	217		
VAP-2C	115	TPID	NVLTPE	LWDLKG	KAI	GHYTQ	MAWDR	TYRLGCGI	ANCPKMS	YVVCH	163	
ASP-1N	135	VGPD	N	KYNGG	LFAFSN	VMVYSE	TTKLGCAY	KVCGTKL	AVSCI	176		
ASP-1C	120	VGPS	NVLT	TA	LWNR	PGMQI	GHYTQ	MAWDT	TYKLGCAY	VFCNDFT	FGVCQ	168
VAP-3	121	WKS	NLMT	ID	LFNTG	GHATQ	MAWAK	SNLIGCGV	KDCGRD	SNGLNK	VTVCQ	171
MSP-1	131	VPPSWIN	NFLPTD	NKENDE	KFEAVGH	WTQMAWA	KTYQIGCAL	KVCHKP	DCNGN	LIDCR	188	

To Fig.3-3



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FIG.3-3

FROM Fig.3-2

VAP-1N	173	YNKI	GYMT	NA	I	YE	KG	DA	CT	SD	AE	CT	TY	S	---	D	SQ	CK	NG	LC	Y	KA	---	213																
VAP-1C	172	YGP	AG	NY	MN	QL	I	Y	T	KG	SP	CT	AD	AD	CP	GT	Q	---	T	CS	VA	EAL	C	---	212															
VAP-2N	218	YNE	KA	Q	CE	KE	M	Y	ENG	KP	CC	ED	KD	CF	TY	PG	SK	CL	V	PE	GL	CQ	AP	SM	VK	DD	GG	268												
VAP-2C	164	YGP	AG	NR	K	N	K	I	Y	E	I	GP	CE	V	DD	CP	I	GT	---	D	CE	KT	SL	C	---	205														
ASP-1N	177	YNG	V	G	I	T	N	Q	P	M	WE	T	G	AC	KT	GA	DC	ST	Y	K	---	NS	GC	ED	GL	CT	K	GP	---	218										
ASP-1C	169	YGP	GN	Y	M	G	H	V	I	Y	T	M	G	Q	PC	S	---	QC	SP	GA	---	TC	SV	TE	GL	C	S	---	A	---	P	---	206							
VAP-3	172	YK	P	Q	GN	F	I	N	Q	Y	I	Y	V	S	GA	T	CS	---	GC	PS	GT	---	SC	ET	ST	GL	CV	---	---	---	---	207								
MSP-1	189	Y	Y	P	G	G	N	G	M	G	S	P	I	Y	Q	G	K	P	AS	---	GC	G	K	AG	---	P	ST	K	Y	S	GL	CK	P	D	P	H	Q	NN	---	231

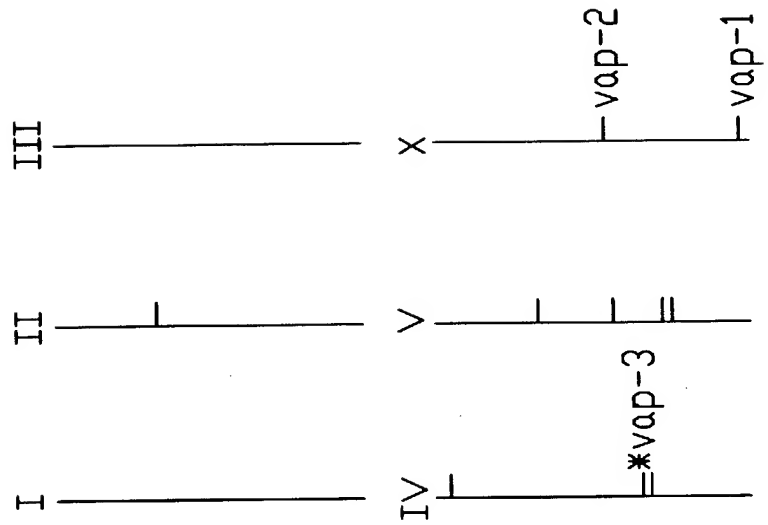


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FIG.4

Schematic map of selected *C. elegans* vap genes





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FIG. 5B

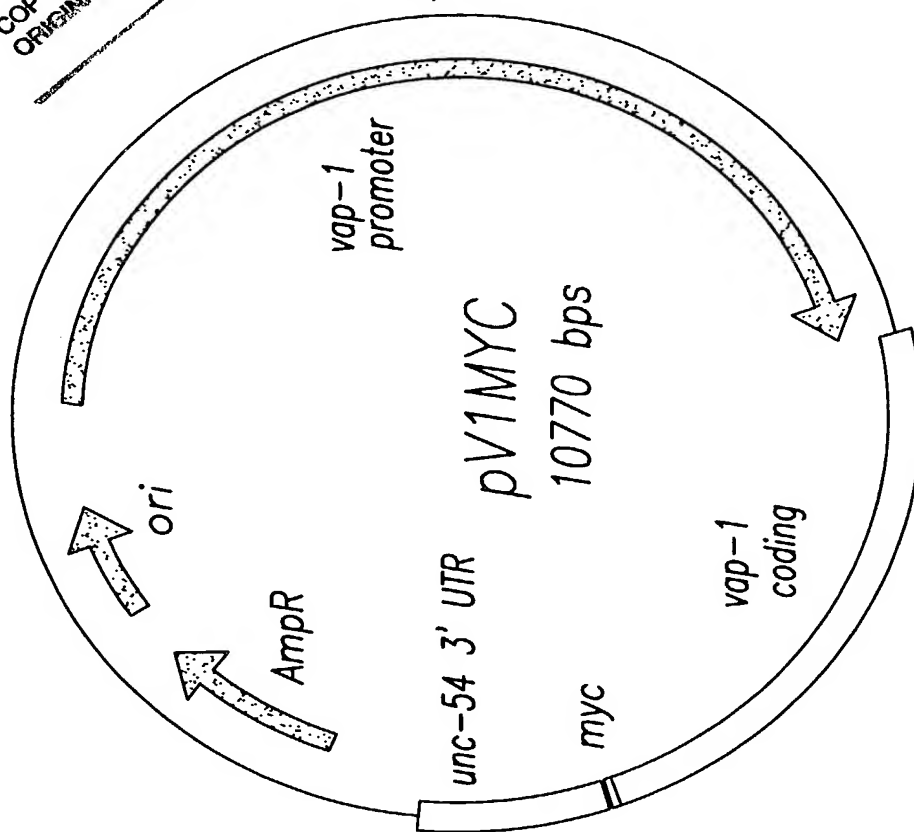
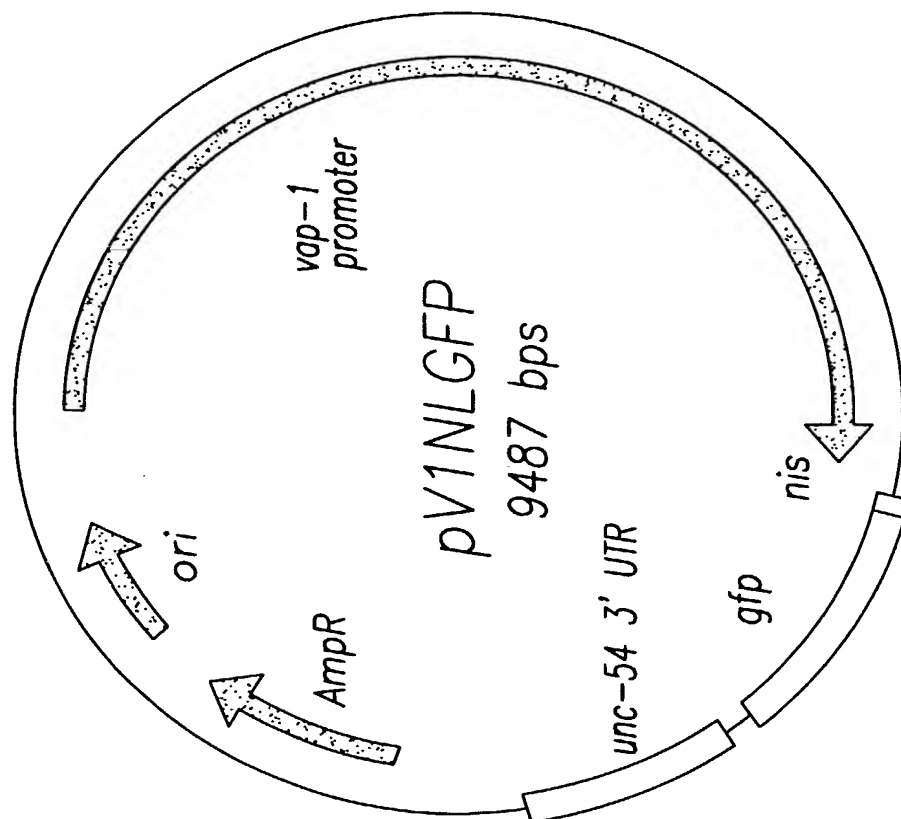


FIG. 5A



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FIG. 6A



FIG. 6B

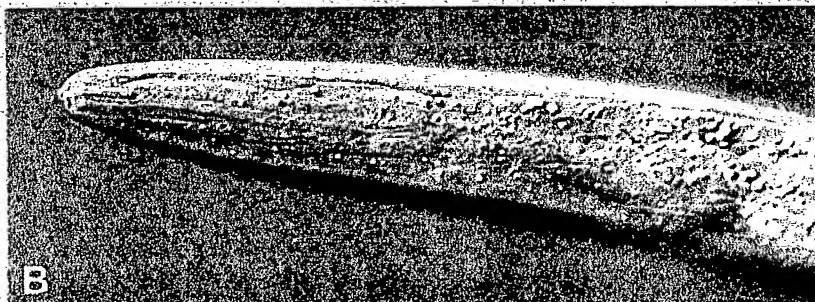


FIG. 6C





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FIG. 7

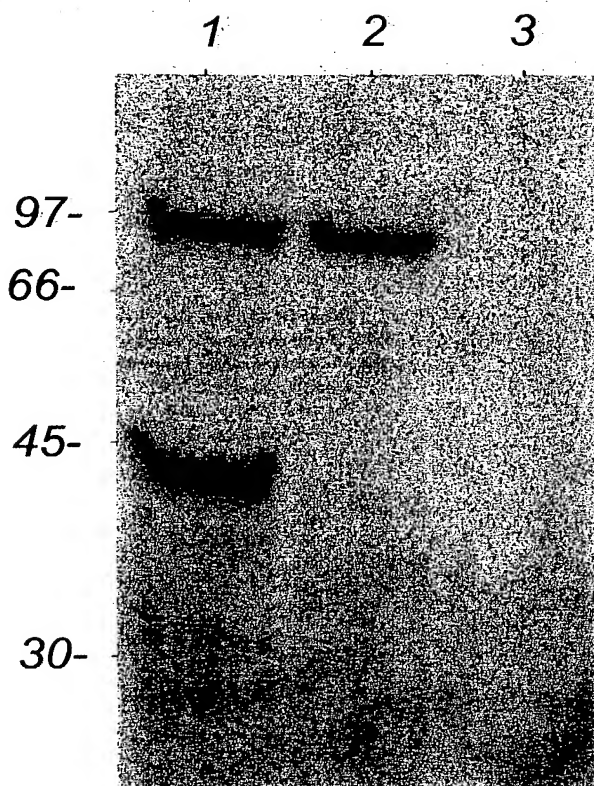


FIG. 8

